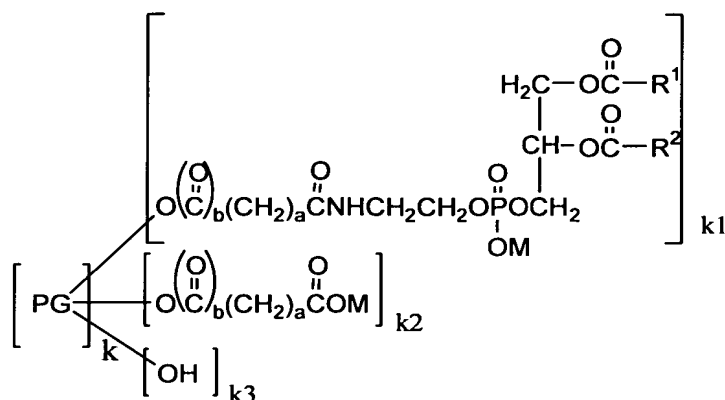


What is claimed is:

1. A phospholipid derivative represented by the following formula (1):



wherein [PG]_k represents a residue of polyglycerin having a polymerization degree of k, wherein k is 2 to 50, R¹CO and R²CO independently represent an acyl group having 8 to 22 carbon atoms, symbol "a" independently represents an integer of 0 to 5, symbol "b" independently represents 0 or 1, M represents hydrogen atom, an alkali metal atom, an ammonium, or an organic ammonium, and k₁, k₂, and k₃ represent numbers satisfying the following conditions: 1 ≤ k₁ ≤ (k+2)/2, 0 ≤ k₂, and k₁ + k₂ + k₃ = k + 2.

2. The phospholipid derivative according to claim 1, wherein k₁ satisfies 1 ≤ k₁ ≤ 2.
3. The phospholipid derivative according to claim 1 or 2, wherein k₂ satisfies 0 ≤ k₂ ≤ 1.
4. The phospholipid derivative according to any one of claims 1 to 3, wherein k₁, k₂, and k₃ satisfy 8 ≤ k₁ + k₂ + k₃ ≤ 52.
5. The phospholipid derivative according to any one of claims 1 to 4, wherein R¹CO and R²CO independently represent an acyl group having 12 to 20 carbon atoms.
6. The phospholipid derivative according to any one of claims 1 to 5, wherein k₂ is 0.
7. The phospholipid derivative according to claim 6, wherein a and b represent 0.
8. The phospholipid derivative according to any one of claims 1 to 5, wherein

k₂ satisfies 0 < k₂.

9. A lipid membrane structure comprising the phospholipid derivative according to any one of claims 1 to 8.

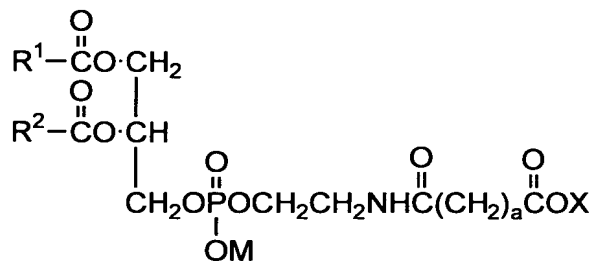
10. The lipid membrane structure according to claim 9, which is a liposome.

11. A surfactant comprising the phospholipid derivative according to any one of claims 1 to 8.

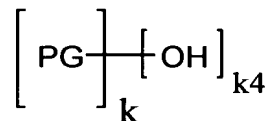
12. A solubilizer comprising the phospholipid derivative according to any one of claims 1 to 8.

13. A dispersing agent comprising the phospholipid derivative according to any one of claims 1 to 8.

14. A method for producing the phospholipid derivative according to claim 1, which comprises the step of reacting a compound represented by the following formula (2):



wherein R¹, R², a, and M have the same meanings as defined above, and X represents hydrogen atom or N-hydroxysuccinimide, with a polyglycerin represented by the following formula (3):



wherein [PG]_k represents a residue of polyglycerin having a polymerization degree of k, wherein k has the same meaning as defined above, and k₄ is a number satisfying the following condition: k₄ = k + 2.

15. A method for producing the phospholipid derivative according to claim 1, which comprises the following steps:

(A) the step of reacting a polyglycerin with a dibasic acid or a halogenated carboxylic

acid to obtain a carboxylated polyglycerin; and

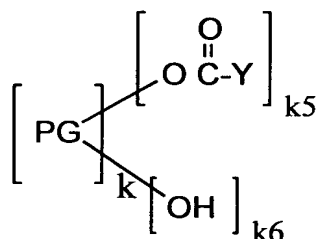
(B) the step of reacting the carboxylated polyglycerin obtained in the step (A) with a phospholipid.

16. A method for producing the phospholipid derivative according to claim 1, which comprises the following steps:

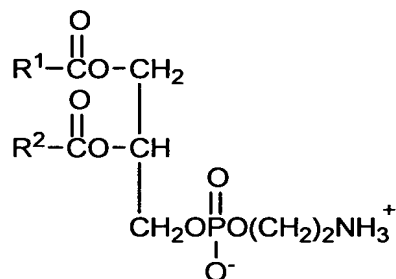
(A) the step of reacting a polyglycerin with a halogenated carboxylic acid ester and hydrolyzing the resulting ester compound to obtain a carboxylated polyglycerin; and

(B) the step of reacting the carboxylated polyglycerin obtained in the step (A) with a phospholipid.

17. A method for producing the phospholipid derivative according to any one of claims 1 to 7, which comprises the step of reacting a polyglycerin derivative represented by the following formula (4):



wherein [PG]_k represents a residue of polyglycerin having a polymerization degree of k, wherein k represent a number of 2 to 50, Y represents hydroxyl group or a leaving group, and k₅ and k₆ are numbers satisfying the following conditions: $1 \leq k_5 \leq (k+2)/2$, and $k_5 + k_6 = k + 2$, with a phospholipid represented by the following formula (5):



wherein R¹ and R² have the same meanings as defined above, in an organic solvent in the presence of a basic catalyst.

18. A pharmaceutical composition containing the lipid membrane structure according to claim 9 retaining a medicament.

19. The pharmaceutical composition according to claim 18, wherein the medicament is an antitumor agent.